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10/779,365	02/13/2004	Timothy D. Flynn	BFM-02501	7888

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EXAMINER	
HIRL, JOSEPH P	

ART UNIT	PAPER NUMBER
2129	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/779,365	FLYNN ET AL.	
	Examiner	Art Unit	
	Joseph P. Hirl	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-107* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-107* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *05/10/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-107 are rejected.

Specification Objection

2. Page 1, line 5, remove "Attorney Docket No. BFM-02560,"

Page 1, lines 6, 7, remove "Attorney Docket No. BFM-02561,"

Page 1, line 7 remove "Attorney Docket No. BFM-01501," and

Page 1, line 10 remove "Attorney Docket No. BFM-01560,"

Page 7, line 20 and page 73, line 10, and page 8, line 5 and page 73, line 22: the equations are incorrect:

Using Fig. 12,

a. the bias into the output layer will not be the same as the bias into the second section of the hidden layer.

b. the bias, $b1_i$, is incorrectly summed over 1 – P instead of 1- n.

c. the weight, $W2_i$, is incorrectly summed over 1 – P instead of 1- n.

d. the equation incorrectly weights the results of the hidden layer by summing over P instead of n.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1-107 Neural networks require either supervised or unsupervised training related to the field of application. Without such training, the network is not capable of effectively functioning. Unless functional related values are input to the Kalman filter and such Kalman filter is appropriately derived, determination of weight cannot be made.

5. Claims 57-107 are rejected under 35 U.S.C. 101 because the claimed invention relates to non-statutory subject matter. Computer programs per se are computer listings or expressions and are not physical "things."

6. Claims 16 and 72 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. If $\cos[\varphi] = 0$ or near 0, N_r is a small value, R = is a small value, Ω is a small value and OAT is small, the equations are not defined.

7. Claims 35 and 91 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. When tanh is zero, the sensitivity is not effective.

8. Claims 36 and 92 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. When $\cosh^{-2}$ is zero, the sensitivity is not defined.

9. Claims 35, 36, 91 and 92 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility for the reasons cited under the specification objections above. Further claims 37 and 93 are rejected since such claims perform the particial derivative on equations that are non functional.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

11. Claims 1-107 are rejected under 35 USC 112, first paragraph because current case law (and accordingly, the MPEP) require such a rejection if a 101 rejection is given because when Applicant has not in fact disclosed the practical application for the invention, as a matter of law there is no way Applicant could have disclosed how to practice the undisclosed practical application. This is how the MPEP puts it:

> ("The how to use prong of section 112 **incorporates as a matter of law** the requirement of 35U.S.C. 101 that the specification disclose as a matter of fact a practical utility for the invention.... If the application fails as a matter of fact to satisfy 35 U.S.C. 101, then the application **also fails as a matter of law** to enable one of ordinary skill in the art to use the invention under 35 U.S.C. § 112."); In re Kirk, '376 F.2d 936, 942, 153 USIPQ 48, 53 (CCPA 1967) ("Necessarily, compliance with § 112 requires a description of how to use presently useful inventions, **otherwise an applicant would anomalously be required to teach how to use a useless invention**."). See, MPEP 21107.01 (IV), quoting In re Kirk (emphasis added).

Therefore, claims 1-107 are rejected on this basis.

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claims 1, 11, 13, 17, 23, 25, 26, 28, 29, 31, 39, 40, 41, 52, 55, 56, 79, 81, 82, 84, 85, 95, 96, 101, 102 and 104 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "flight regime" is relative in one application to another and therefore renders the claims indefinite.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claim1-37 and 57-93 are rejected under 35 U.S.C. 102(b) as being anticipated by McCool et al (USPN 5,987,397, referred to as **McCool**).

Examiner's Note (EN): Person having ordinary skill in the art (PHOSITA) would know and understand "Elements of Artificial Neural Networks" by Kishab Mehrotra et al." The reference by McCool has its basis in this neural network technology (MPEP 2112).

Claims 1, 52, 57

McCool anticipates determining a flight regime in accordance with one or more inputs (**McCool**, c1:35-52); selecting a neural net in accordance with said flight regime (**McCool**, c1:35-52); and determining said weight using said neural net (**McCool**, c 1:35-52; EN: ¶ 21. applies; flight regime is interpreted without limitations).

Claims 2, 53, 58

McCool anticipates said neural net is trained offline prior to determining said weight of said aircraft (**McCool**, c1:35-52; EN: weight is developed from input data which is of the unprocessed form).

Claims 3, 59

McCool anticipates said determining said weight of said aircraft is performed during operation of said aircraft (**McCool**, c1:35-52; EN: real time meaning performance of the aircraft).

Claims 4, 60

McCool anticipates neural net is one of a plurality of neural nets (**McCool**, c1:35-52; EN: plurality occurs during training/learning).

Claims 5, 61

McCool anticipates the neural net is a feedforward neural net (**McCool**, c1:35-52; EN: such is a standard neural network).

Claims 6, 62

McCool anticipates neural net includes a single hidden layer (**McCool**, c3:8-40; EN: PHOSITA anticipates hidden layer configuration).

Claims 7, 63

McCool anticipates said neural net has a same set of interconnections between each neuron in said hidden layer and an input layer, and a same set of interconnection between said each neuron and an output layer (**McCool**, c 3:8-40; EN: PHOSITA anticipates such a standard network configuration).

Claims 8, 64

McCool anticipates each of said neurons in said hidden layer utilizes a same sigmoidal activation function (**McCool**, c3:8-40; EN: PHOSITA anticipates a step or sigmoidial activation function).

Claims 9, 65

McCool anticipates said neural net includes between 20 and 35 neurons in said hidden layer (**McCool**, c2:32-67; EN: PHOSITA anticipates input data defines hidden layer neurons).

Claims 10, 66

McCool anticipates said weight is used as an input to another process (**McCool**, c2:32-67; EN: for the purpose of generalization).

Claims 11, 67

McCool anticipates the flight regime is one of a plurality of flight regimes that are mutually exclusive from one another (**McCool**, c2:32-67; c3:1-7).

Claims 12, 68

McCool anticipates the flight regime is manually selected (**McCool**, c2:32-67; c3:1-7; EN: aircraft is human operated).

Claims 13, 69

McCool anticipates the flight regime is an effective flight regime including one or more actual flight regimes using the same set of one or more neural nets (**McCool**, c2:32-67; c3:1-7).

Claims 14, 70

McCool anticipates one or more neural net inputs are used as inputs to said neural net selected, and the one or more neural net inputs include at least one derived parameter that is determined based on mathematical and physical relationships of measured data (**McCool**, c2:32-67; c3:1-7; Fig. 2).

Claims 15, 71

McCool anticipates the one or more neural net inputs are a first number of derived parameters determined using a second number of raw data values, the second number being greater than said first number (**McCool**, c2:32-67; c3:1-7; Fig. 2; EN: such would be increase in the rate of climb).

Claims 17, 73

McCool anticipates neural net inputs include roll attitude and pitch attitude in accordance with the selected flight regime (**McCool**, c2:32-67; c3:1-7).

Claims 18, 74

McCool anticipates neural net inputs is a derived parameter based on at least one of roll attitude and pitch attitude in accordance with the 20 selected flight regime(**McCool**, c2:32-67; c3:1-7; EN: such will occur in the training mode).

Claims 19, 75

McCool anticipates neural net is included in a gross weight processor (**McCool**, c2:32-67; c3:1-7; Figs. 1 & 2).

Claims 20, 76

McCool anticipates the gross weight processor is included on the aircraft for which said weight is determined

Claims 21, 77

McCool anticipates the gross weight processor is included at a ground location and communicates with said aircraft (**McCool**, c2:32-67; c3:1-7; Figs. 1 & 2).

Claims 22, 78

McCool anticipates the one or more inputs include at least one of: a sensor measurement, manual input, data from a storage location sensors will determine the various inputs).

Claims 23, 79

McCool anticipates determining said flight regime as a hover flight regime in accordance with the following input parameters: landing flag, takeoff flag, weight on wheels, yaw rate, rate of climb, pitch attitude, roll attitude, drift velocity, ground speed, airspeed, and control reversal flag, wherein said landing flag indicates whether said aircraft is landing, said takeoff flag indicates whether said aircraft is in takeoff mode, and said control reversal flag indicates whether said aircraft is in a reversal mode (**McCool**, c2:32-67; c3:1-7; EN: other input includes that which is related to flight operations.

Claims 24, 26, 27, 30, 80, 82, 83, 86

McCool anticipates said landing flag indicates no landing, said takeoff flag indicates no takeoff, said weight on wheels indicates no weight on wheels, said control reversal flag indicates that said aircraft is not in reversal mode, said yaw rate has an approximate value within the inclusive range of -2.5 <= yaw rate 2.5 <= degrees/second, said pitch attitude is within the inclusive range of: -10 <= pitch angle <= 10 degrees, said rate of climb is approximately within the inclusive range of: -500 <= rate of climb <= 500 feet/minute, said roll attitude approximates a value within the inclusive range of: -6 <= roll attitude <= 3 degrees, said drift velocity approximates a value within the inclusive range of: -7 <= drift velocity <= 7, said ground speed

approximates a value within the inclusive range of: -7<= ground speed <= 7 knots, said airspeed is an approximate value less than or equal to 38 knots. (**McCool**, c2:32-67; c3:1-7; Figs. 1 & 2; EN: the various values are covered under the plurality of measurements associated with the various units; various operations do not change the functionality of the disclosed methodology).

Claims 25, 28, 31, 81, 84, 87

McCool anticipates determining that said aircraft is in a hover flight regime at a first point in time; and determining that said aircraft remains in said hover flight regime at a second later point in time if said airspeed at said second later point in time does not exceed 43 knots (**McCool**, c2:32-67; c3:1-7; Figs. 1 & 2; EN: the various values and operations are covered under the plurality of measurements associated with the various units).

Claims 29, 85

McCool anticipates determining said flight regime as a turn flight regime in accordance with the following input parameters: landing flag, takeoff flag, weight on wheels, roll attitude, airspeed, and rate of climb, wherein said landing flag indicates whether said aircraft is landing and said takeoff flag indicates whether said aircraft is in takeoff mode (**McCool**, c2:32-67; c3:1-7; Figs. 1 & 2; EN: the various values and operations are covered under the plurality of measurements associated with the various units).

Claims 32, 88

McCool anticipates one or more inputs are scaled within a predetermined range (**McCool**, c2:32-67; c3:1-7; Figs. 1 & 2; EN: such are inflight measurement of variable input parameters).

Claims 33, 89

McCool anticipates determining a sensitivity of said weight with respect to a parameter used in determining said weight (**McCool**, c2:32-67; c3:1-7; Figs. 1 & 2; EN: such is correlation of actual to estimated weight).

Claims 34, 90

McCool anticipates said sensitivity of said weight with respect to said parameter is determined in accordance with a partial derivative of said weight with respect to said parameter (**McCool**, c2:32-67; c3:1-7; Fig. 3; EN: such is the slope of the related figure).

Claims 35, 91

McCool anticipates weight is determined using a neural network and represented by the equation identified in claim 35 (**McCool**, c2:32-67; c3:1-40; EN: equation is of the standard form used by POSITA).

Claims 36, 37, 92, 93

McCool anticipates neural network is a feedforward neural net with one hidden layer containing p sigmodial neurons and the sensitivity is represented by the equation identified in claim 36) (**McCool**, c2:32-67; c3:1-40; Fig. 3; EN: the slope of the line represents the partial derivative relative to actual gross weight).

Claims 48, 56

Smith anticipates a regime recognizer that determines a regime indicator in accordance with a portion of said one or more inputs (**McCool,** c2:32-67; EN: regime is merely characteristics related input data); and a gross weight estimator that determines said weight of said aircraft, said gross weight estimator including at least one of a Kalman filter, and one or more neural nets, and using at least one of said Kalman filter and a first of said one or more neural nets in determining said weight (**McCool,** c2:32-67).

Claim 49

Smith anticipates an input processor that processes one or more inputs producing one or more processed inputs, said one or more inputs including at least one sensor measurement (**McCool,** c2:32-67; Fig. 2); and a portion of said one or more processed inputs are neural net inputs used by said one or more neural nets, and said gross weight estimator including: a neural net selector that selects a neural net in accordance with said regime indicator (**McCool,** c2:32-67; Fig. 2: EN: ¶ 21 applies; regime is merely characteristics related input data).

Claim 50

Smith anticipates regime recognizer is included in said input processor (**McCool,** Fig. 1).

Claim 51

Smith anticipates gross weight estimator includes one or more neural nets whose output, when said one or more neural nets is selected in accordance with said flight

regime indicator, is an input to said Kalman filter (**McCool**, c1:35-52; EN: ¶ 21 applies; regime is merely characteristics related input data; Kalman filter is not apart of this process since it was not required in claim 48).

Claim Rejections - 35 USC § 102

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

17. Claims 38 - 56 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith et al (USPN 5,606,505, referred to as **Smith**).

Claims 38, 54, 94

Smith anticipates receiving one or more values (**Smith**, Fig. 1); and determining said weight using a Kalman filter wherein said one or more values are used as inputs to said Kalman filter (**Smith**, Figs. 1, 2; EN: such weights are incorporated to determine the related Taylor series expansion).

Claims 39, 55, 95

Smith anticipates one or more measurements are input to said Kalman filter, and the method further comprising: determining a flight regime in accordance with one or more regime measurements (**Smith**, c3:33-63); selecting a function based on said .flight

regime (**Smith**, c3:33-63); and determining a covariance associated with one of said measurements in accordance with said function (**Smith**, c3:33-63).

Claims 40, 96

Smith anticipates hover flight regime, and said function determines said covariance associated with a weight estimate (**Smith**, c3:33-63; EN: ¶ 21 applies; hover merely means to remain in the vicinity and then any fixed wing aircraft qualifies).

Claims 41, 97

Smith anticipates function determines said covariance in accordance with body accelerations of said aircraft along x and z axes, roll attitude, pitch attitude, airspeed and altitude (**Smith**, c7:64-67; c8:1-12).

Claims 42, 98

Smith anticipates one or more measurements are input to said Kalman filter, said one or more measurements including at least one of: a weight estimate, and engine fuel flow rate (**Smith**, c3:33-63).

Claims 43, 99

Smith anticipates weight estimate is a predetermined value based on vehicle flight and performance data (**Smith**, c8:24-37).

Claims 44, 100

Smith anticipates weight estimate is based on manually entered data representing a sum gross weight of said aircraft (**Smith**, c8:24-37).

Claims 45, 101

Smith anticipates flight regime is manually determined (**Smith**, c18:7-37).

Claims 46, 102

Smith anticipates flight regime is determined in accordance with a predetermined mapping that maps one or more values to a particular flight regime, wherein a given set of one or more inputs values uniquely maps to a flight regime (**Smith**, c3:33-63; EN: such is the learning process).

Claims 47, 103

Smith anticipates Kalman filter produces an output used as an input to another component (**Smith**, Fig. 1).

Examination Considerations

18. The claims and only the claims form the metes and bounds of the invention. "Office personnel are to give the claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris,* 127 F.3d 1048, 1054-55, 44USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim are not read into the claim. *In re Prater*, 415 F.2d, 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, l 45-48; p 2100-9, c 1, l 1-4). The Examiner has full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning.

19. Examiner's Notes are provided with the cited references to prior art to assist the applicant to better understand the nature of the prior art, application of such prior art and, as appropriate, to further indicate other prior art that maybe applied in other office actions. Such comments are entirely consistent with the intent and spirit of compact prosecution. However, and unless otherwise stated, the Examiner's Notes are not prior art but a link to prior art that one of ordinary skill in the art would find inherently appropriate.

20. Unless otherwise annotated, Examiner's statements are to be interpreted in reference to that of one of ordinary skill in the art. Statements made in reference to the condition of the disclosure constitute, on the face of it, the basis and such would be obvious to one of ordinary skill in the art, establishing thereby an inherent prima facie statement.

21. Examiner's Opinion: ¶¶ 18-20 apply. The Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Conclusion

22. The prior art of record and not relied upon is considered pertinent to applicant's disclosure.

- M. Idan et al, In-Flight Weight and Balance Identification Using Neural Networks

- R. Mack et al, A Rapid Empirical Method for Estimating the Gross Takeoff Weight of a High Speed Civil Transport
- K. Mehrotra, Elements of Artificial Neural Networks
- Calise et al, USPN 6,332,105
- M. Morales, Feasibility of Aircraft Gross Weight Estimation Using Artificial Neural Networks
- M. Napolitano et al, Kalman Filters and Neural-Networ Schemes for Sensor Validation in Flight Control Systems
- McColl et al, USPN 6,466,888
- J. Moffatt, Helicopter Gross Weight Determination from Monitored Parameters

23 Claims 1-107 are rejected.

Correspondence Information

23. Any inquiry concerning this information or related to the subject disclosure should be directed to the Primary Examiner, Joseph P. Hirl, whose telephone number is (571) 272-3685. The Examiner can be reached on Monday – Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, David R. Vincent can be reached at (571) 272-3080. Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

Hand delivered to:

Receptionist,

Customer Service Window,

Randolph Building,

401 Dulany Street,

Alexandria, Virginia 22313,

(located on the first floor of the south side of the Randolph Building);

or faxed to:

(571) 273-8300 (for formal communications intended for entry.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have any questions on access to Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

P.E.

Joseph P. Hirl
Primary Examiner
July 11, 2006